Human Genome Studies — Biology and Biotechnology

Addressing the nation's health concerns through science and engineering

Identifying and characterizing the human health effects resulting from energy use and development is a critical health concern facing our nation today. The focus of LLNL's Biology and Biotechnology Research Program is to develop a scientific foundation for understanding the long-term health consequences of energy use and development and for developing technological solutions for these issues. In particular, our goals are to understand the molecular and cellular mechanisms that lead to adverse effects and to develop technologies and resources to prevent them.

Human Genome Center

Our Human Genome Center conducts multidisciplinary, team-oriented research in the life and health sciences. Working in collaboration with industry, universities, and other government agencies, teams comprised of biologists, chemists, molecular biologists, physicists, computer scientists, engineers, and mathematicians perform internationally recognized research in such areas as:

- Developing detailed maps of chromosome regions of interest
- Developing and applying high-throughput DNA sequencing to identify genes and structural domains
- Finding specific disease genes
- Devising methods to process, manage, store, analyze, and present molecular biology data in an efficient and user-friendly manner
- Developing and adapting software and instrumentation for new genetic and molecular biology studies.

APPLICATIONS

- *Develop detailed maps of chromosomes*
- *Locate specific disease genes*
- *Disease prevention, individualized medical treatments and forensics*

Other health effects research

Our Biodosimetry and Molecular Toxicology groups have developed novel biomarkers of genetic damage produced by exposure to radiation and chemicals to study the relationship between these exposures and disease. In addition, accelerator mass spectrometry (AMS) is being used in innovative ways to detect ultra-low levels of biological tracers in biomedical applications.

Recent accomplishments

- Established a world-class team of scientists and a supporting computational and engineering infrastructure for efficiently mapping and sequencing regions of interest in the human genome
- Produced unique and valuable biological reagents, chromosomal DNA captured in cosmids, YACs, BACs, and PACs for ready access to any region of interest in the human genome, with special emphasis on chromosome 19
- Developed methods to measure damage to genetic material in the blood cells and sperm of humans and mice.

Future endeavors

Our goals are focused on:

- Identifying new genes, especially genes that define susceptibility to disease
- Evaluating human genetic variation for disease prevention, delivery of individualized medical treatments, and forensics
- Developing new technologies to expedite these studies.

Availability: Specific technologies are available for license, and collaborative proposals are encouraged.

Contact

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